PRESENTATION TITLE SLIDE

Miscellaneous Gram-Negative Rods

Chapter 29 – Medical Microbiology

Your Name
Course / Date

SLIDE 1 — Learning Objectives

On Slide

- Recognize key organisms in miscellaneous Gram-negative rods
- Understand epidemiology and transmission
- Identify major virulence mechanisms
- Distinguish clinical presentations
- Review diagnosis and treatment strategies

Presenter Notes

> Today we're covering organisms that don't fit neatly into Enterobacteriaceae, Vibrio, or Pseudomonas groups.
> These pathogens often cause zoonotic, respiratory, systemic, or vector-borne infections.
> Many are fastidious and require special diagnostic techniques.

SLIDE 2 — What Are "Miscellaneous" Gram-Negative Rods?

On Slide

- Diverse group
- Often zoonotic

- Frequently fastidious
- Many require special culture methods
- Significant public health importance

Presenter Notes

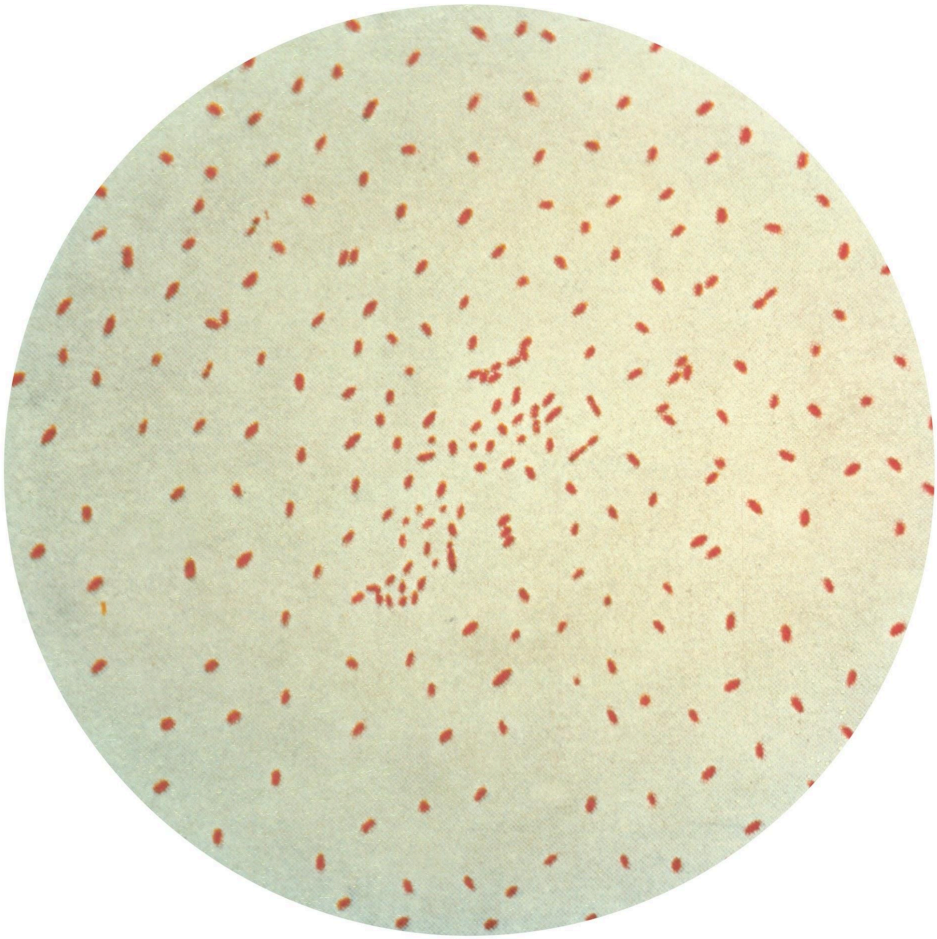
> These organisms are grouped together because they don’t belong to the larger families we previously studied.
> Many are transmitted from animals or arthropods.
> Several require enriched media or intracellular growth.

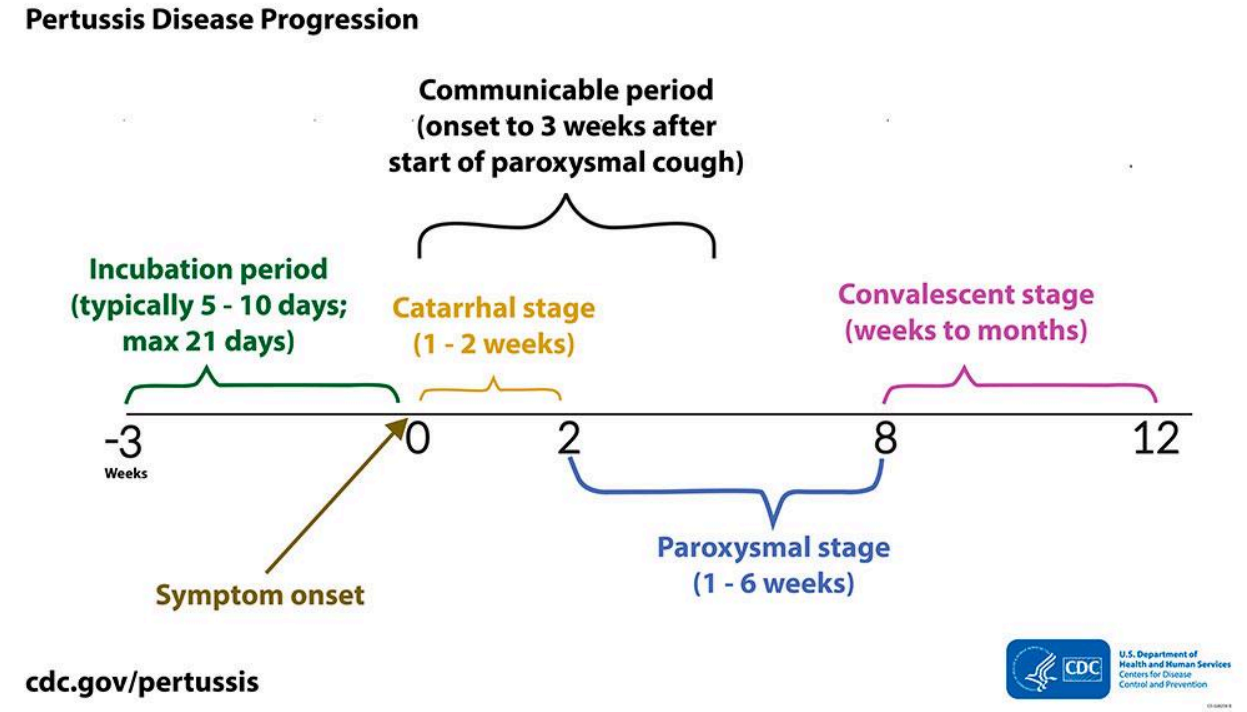
SLIDE 3 — Organisms Covered Today

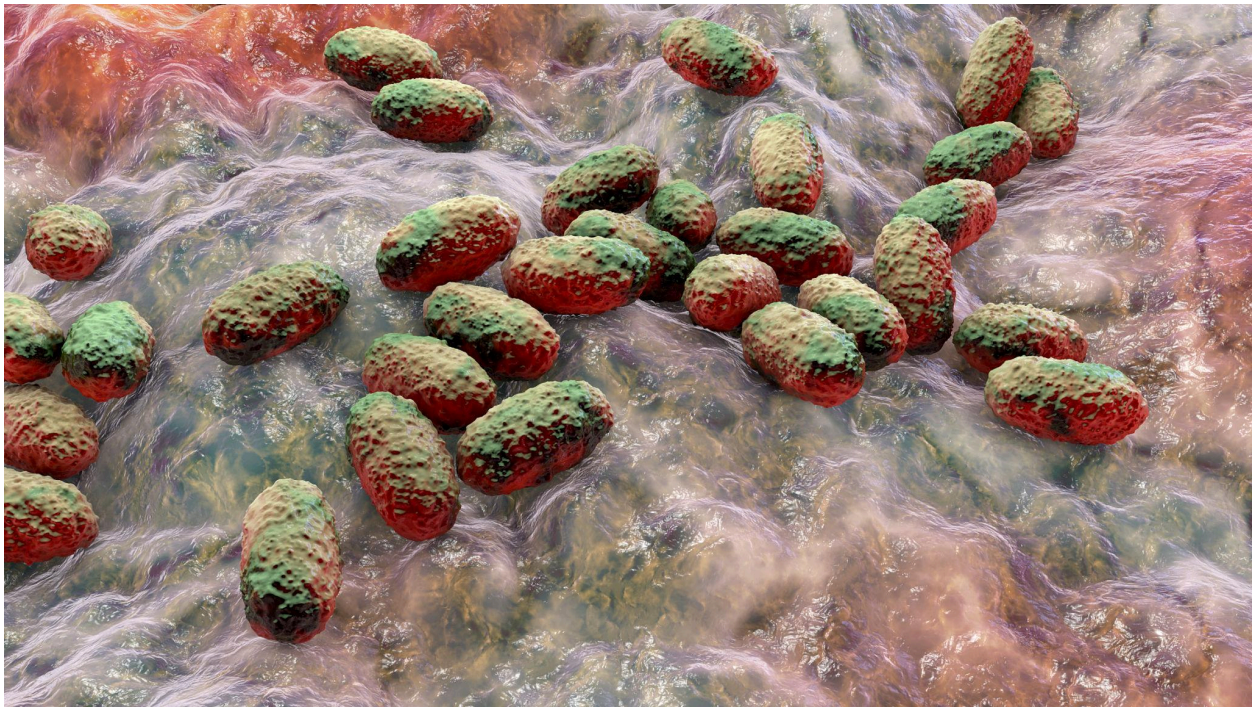
On Slide

- Bordetella
- Brucella
- Francisella
- Legionella
- Bartonella
- Pasteurella (brief review if included in your chapter)
- Others depending on edition

SLIDE 4 — Bordetella pertussis







4

On Slide

- Causes whooping cough
- Strict human pathogen

- Respiratory transmission
- Vaccine-preventable

Presenter Notes

Bordetella pertussis attaches to ciliated respiratory epithelium.
It does not invade deeply but produces toxins that disrupt ciliary function.
Transmission is via respiratory droplets.

SLIDE 5 — Bordetella Virulence Factors

On Slide

- Pertussis toxin (↑cAMP)
- Adenylate cyclase toxin
- Tracheal cytotoxin
- Filamentous hemagglutinin (adhesion)

Presenter Notes

Pertussis toxin increases cAMP levels, disrupting immune responses.
Tracheal cytotoxin damages ciliated cells — leading to the characteristic cough.
The paroxysmal “whoop” occurs after repeated coughing fits.

SLIDE 6 — Clinical Stages of Pertussis

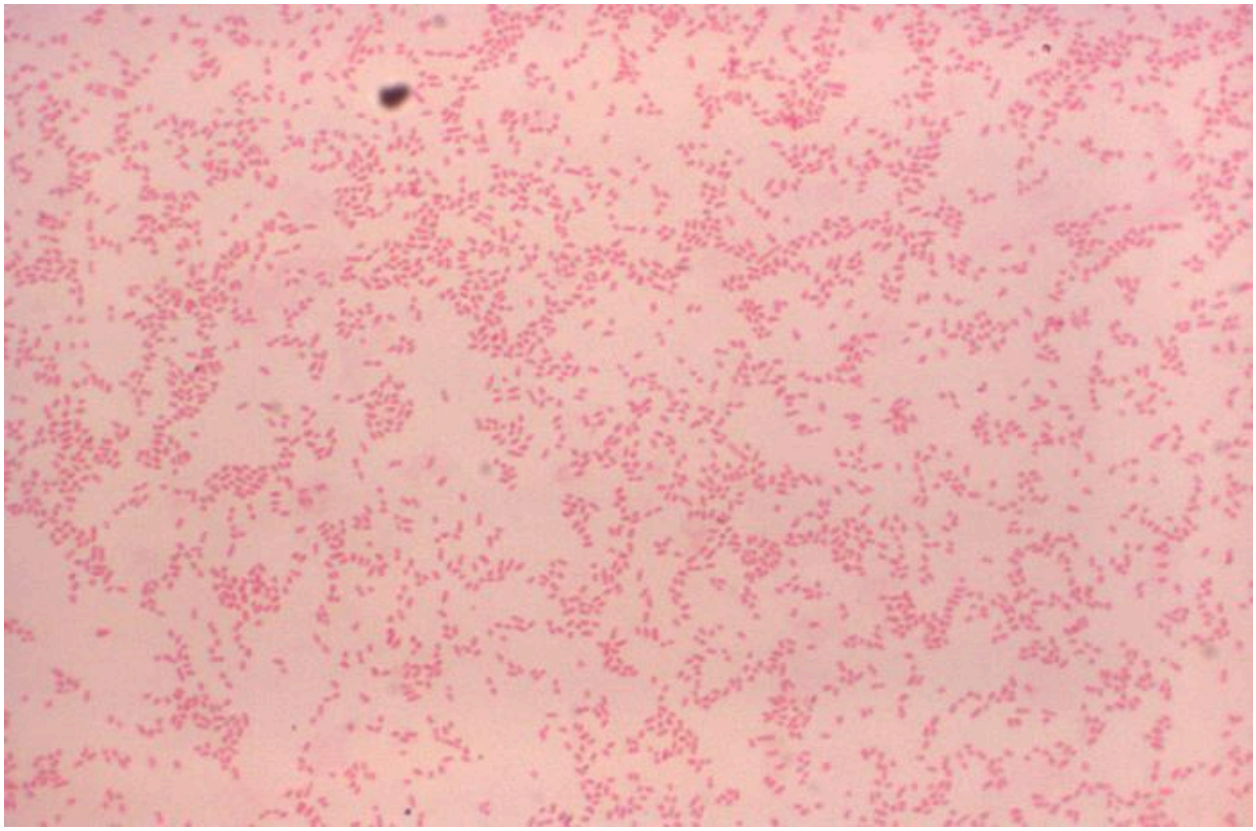
On Slide

1. Catarrhal (mild URI)
2. Paroxysmal (whooping cough)
3. Convalescent

Presenter Notes

The disease progresses through distinct stages.
Early stage resembles a cold.
The paroxysmal stage includes severe coughing fits and post-tussive vomiting.

SLIDE 7 — Brucella Species



4

On Slide

- Zoonotic infection
- Undulating fever
- Intracellular pathogen
- Transmitted via livestock, unpasteurized dairy

Presenter Notes

Brucella is acquired from animals — cattle, goats, sheep.
It survives inside macrophages.
The hallmark symptom is undulating fever.

SLIDE 8 — Brucella Pathogenesis

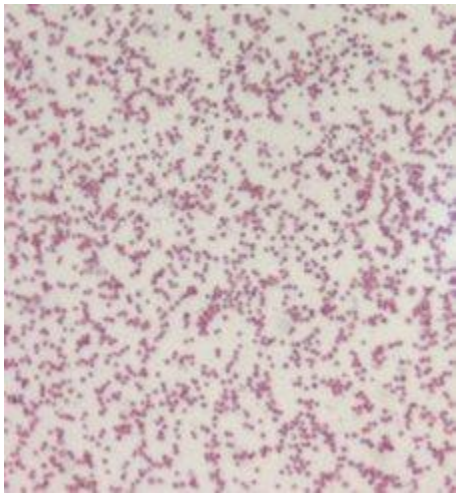
On Slide

- Invades macrophages
- Avoids phagolysosome fusion
- Granuloma formation

Presenter Notes

Because it survives intracellularly, treatment requires combination antibiotics.
Chronic infection is common without proper therapy.

SLIDE 9 — Francisella tularensis



4

On Slide

- Tularemia
- Highly infectious (low infectious dose)
- Zoonotic (rabbits, ticks)
- Category A bioterrorism agent

Presenter Notes

> Francisella is extremely infectious — fewer than 10 organisms can cause disease. Often transmitted via tick bites or handling rabbits.

SLIDE 10 — Tularemia Clinical Forms

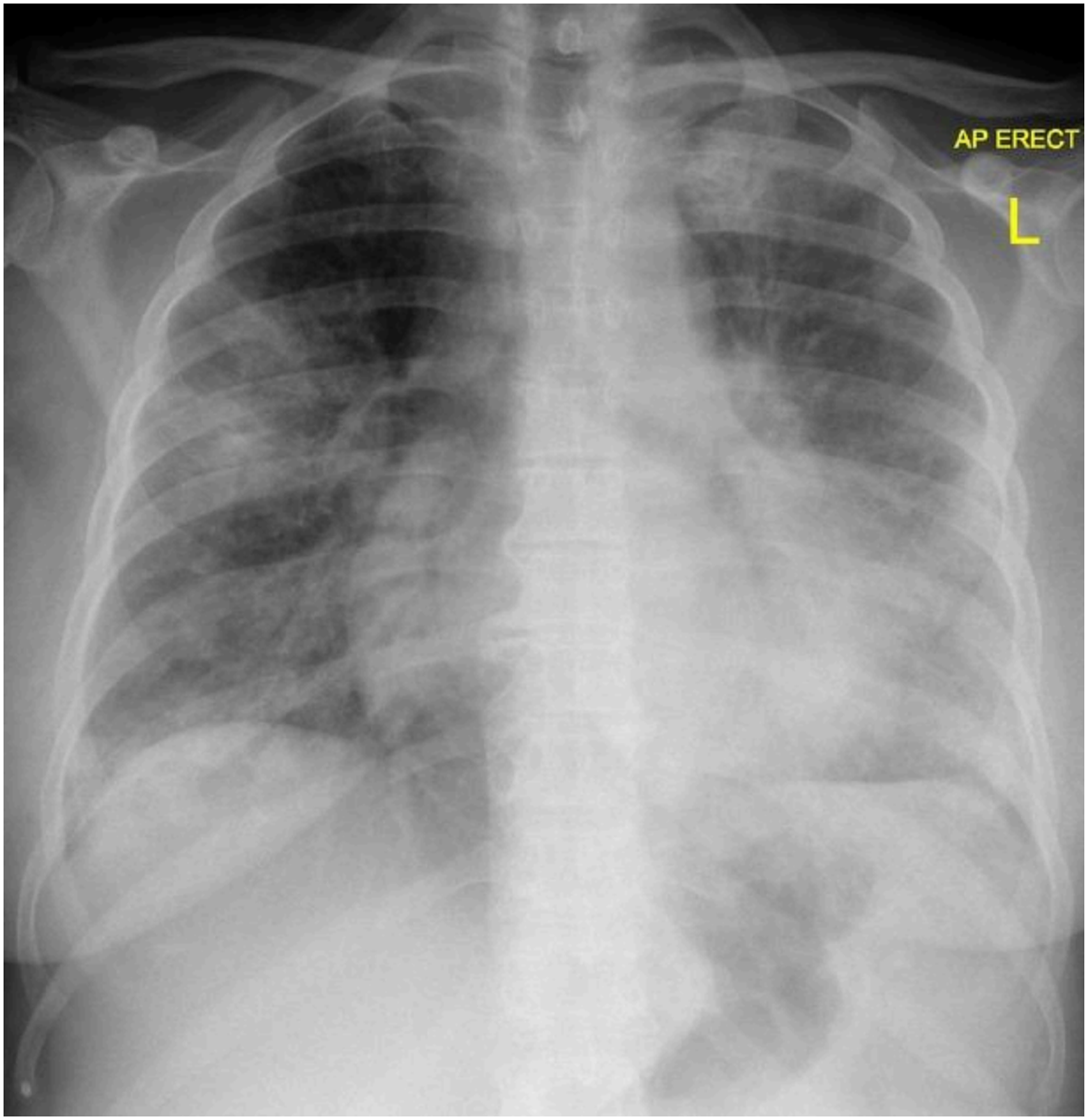
On Slide

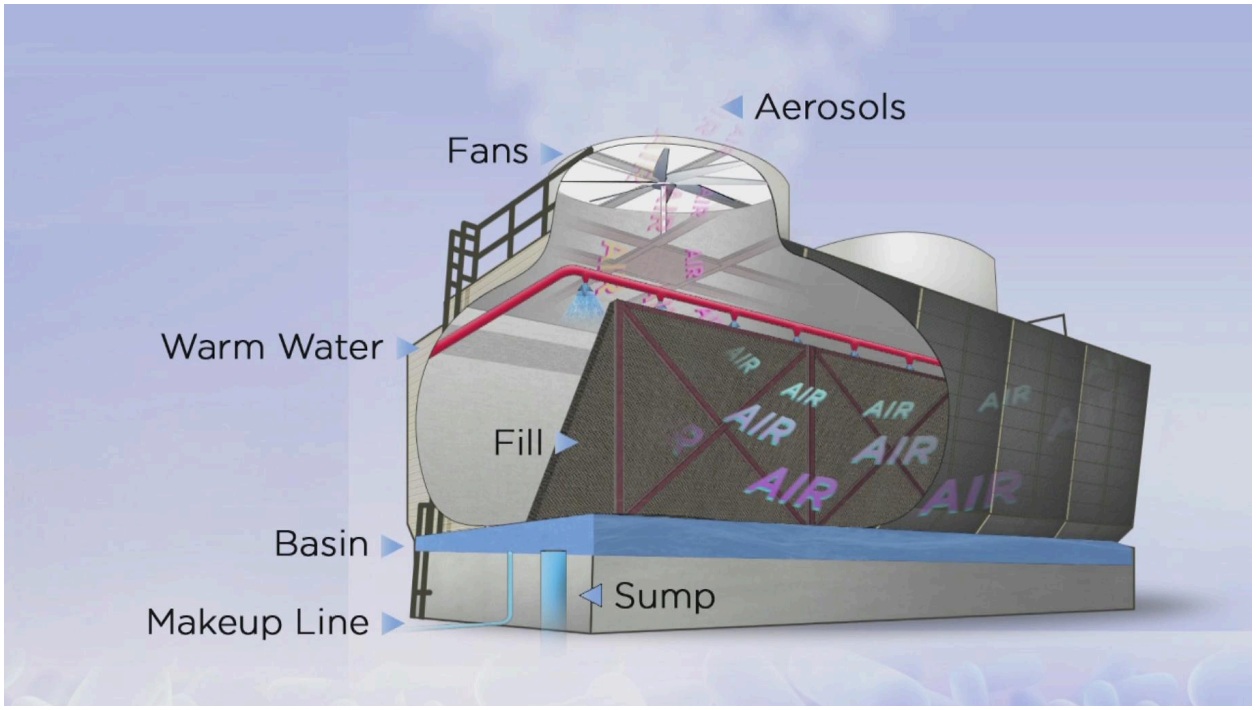
- Ulceroglandular (most common)
- Oculoglandular
- Pneumonic
- Typhoidal

Presenter Notes

> Ulcer at inoculation site + lymphadenopathy is classic.
> Pneumonic form can be severe and potentially fatal.

SLIDE 11 — Legionella pneumophila


AP ERECT
L



4

On Slide

- Legionnaires' disease
- Found in water systems
- Intracellular pathogen
- Requires special culture (BCYE agar)

Presenter Notes

> Legionella lives in water systems, such as cooling towers and plumbing.
> Infection occurs through inhalation of contaminated aerosols.
> It survives inside macrophages.

SLIDE 12 — Legionella Pathogenesis

On Slide

- Inhibits phagolysosome fusion
- Replicates intracellularly
- Causes atypical pneumonia

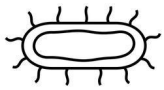
Presenter Notes

Patients present with high fever, cough, and often GI symptoms.
Hyponatremia is common.
Diagnosis is often made by urine antigen testing.

SLIDE 13 — Bartonella Species

CAT SCRATCH FEVER


cat scratch fever


bartonella henselae


cat scratch


bumps under the skin


rash


swollen, painful lymph nodes


fever


muscle aches


joint pain


loss of appetite


weight loss


fatigue


physical exam


blood tests


warm compress to lymph nodes


pain medications

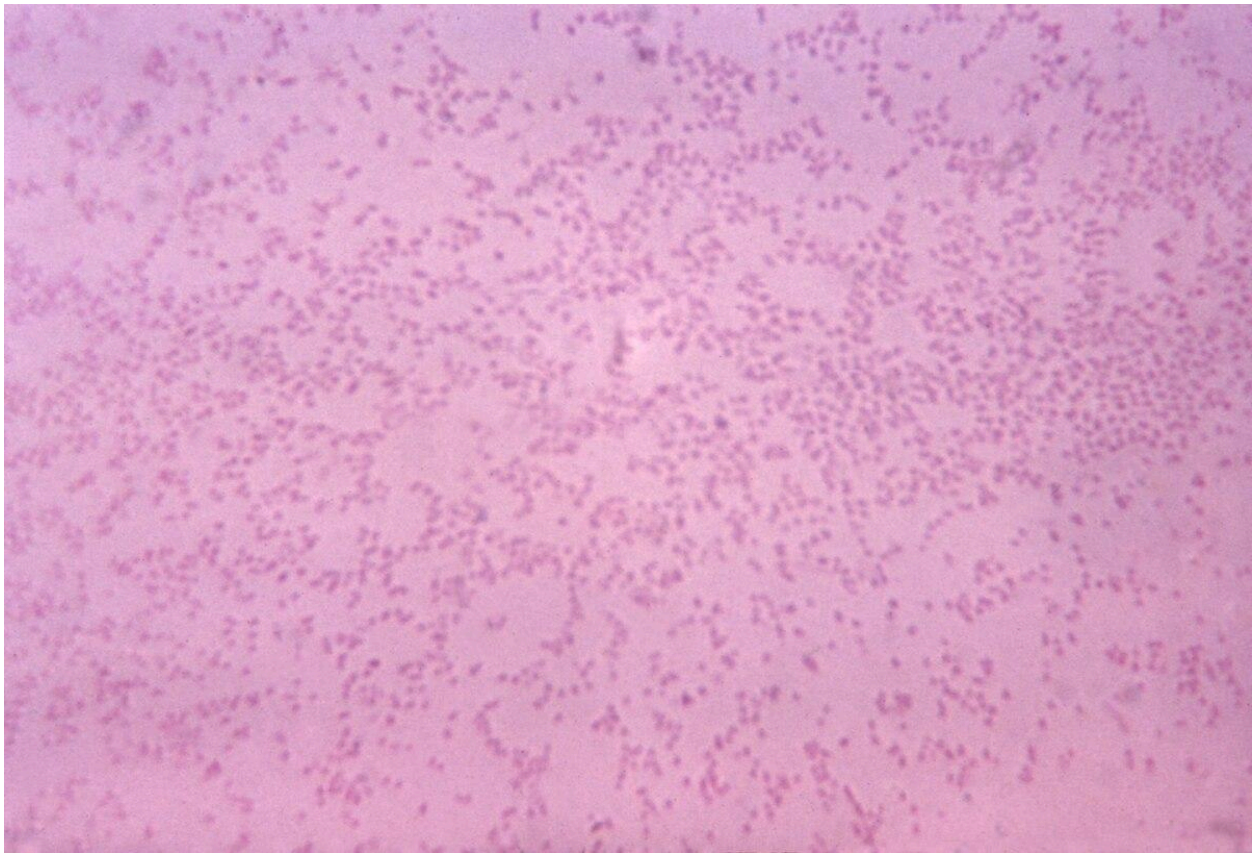
On Slide

- Cat scratch disease
- Bacillary angiomatosis
- Transmitted by cats or fleas

Presenter Notes

Bartonella henselae causes lymph node swelling after cat scratches.
In immunocompromised patients, it can cause vascular proliferative lesions.

SLIDE 14 — Pasteurella multocida



greater progress (Figure 1).

Figure 1: Wound presentation 4 days after dog-bite

On Slide

- Animal bite infections
- Rapid cellulitis
- Capsule enhances virulence

Presenter Notes

Pasteurella is part of animal oral flora.
Infection after cat bites is common.
Rapid onset swelling is typical.

SLIDE 15 — Laboratory Diagnosis Summary

On Slide

- Many require special media
- Intracellular organisms
- PCR often preferred
- Serology useful

Presenter Notes

> These organisms are often fastidious.
> Legionella requires BCYE agar.
> Brucella and Francisella require biosafety precautions.

SLIDE 16 — Treatment Overview

On Slide

- Bordetella → macrolides
- Brucella → doxycycline + rifampin
- Francisella → streptomycin/gentamicin
- Legionella → macrolide or fluoroquinolone
- Bartonella → azithromycin
- Pasteurella → amoxicillin-clavulanate

Presenter Notes

> Many require intracellularly active antibiotics.
> Combination therapy is often needed.

SLIDE 17 — Key Comparison Table

Organism	Zoonotic?	Intracellular?	Toxin-Mediated?

Bordetella	No	No	Yes
Brucella	Yes	Yes	No
Francisella	Yes	Yes	No
Legionella	No	Yes	No
Bartonella	Yes	Yes	No

SLIDE 18 — High-Yield Exam Points

On Slide

- Undulating fever → Brucella
- Whooping cough → Bordetella
- Cooling tower pneumonia → Legionella
- Tick + ulcer → Francisella
- Cat scratch lymphadenitis → Bartonella
- Rapid cellulitis after bite → Pasteurella

SLIDE 19 — Public Health & Prevention

On Slide

- Vaccination (Pertussis)
- Water sanitation (Legionella)
- Animal handling precautions
- Pasteurized dairy products

SLIDE 20 — Conclusion

On Slide

- Diverse but important pathogens
- Often zoonotic

- Frequently intracellular
- Require special diagnostic approaches
- High-yield for exams

Presenter Notes

These organisms are high-yield because of their unique transmission patterns and intracellular survival.
Recognizing epidemiology is often the key to diagnosis.